

Clean Copy of Pending Claims 1-25

Claim 1. An isolated nucleic acid encoding a polypeptide that elongates C₁₆- or C₁₈-fatty acids with at least two double bonds in the fatty acid by at least two carbon atoms, wherein one or more of C_{18:3}^{Δ5,9,12}, C_{20:3}^{Δ8,11,14}, C_{20:4}^{Δ5,8,11,14} and C_{20:50}^{Δ5,8,11,14,17} are not elongated.

Claim 2. An isolated nucleic acid comprising a nucleotide sequence encoding a polypeptide that elongates C₁₆- or C₁₈-fatty acids with at least two double bonds in the fatty acid molecule, wherein said nucleotide sequence is selected from the group consisting of:

- a) the sequence of SEQ ID NO:1;
- b) a nucleic acid sequence which, in accordance with degeneracy of the genetic code, is derived from the amino acid sequence of SEQ ID NO:2; and
- c) derivatives of the sequence of SEQ ID NO:1 which encode polypeptides with at least 50% homology with the amino acid sequences of SEQ ID NO:2, wherein the sequence acts as a C₁₆- or C₁₈-elongase.

Claim 3. The nucleic acid sequence of claim 2, wherein the sequence is derived from an Oomycete.

Claim 4. The nucleic acid sequence of claim 2, wherein the sequence is derived from Phytophthora.

Claim 5. An amino acid sequence encoded within the nucleic acid of claim 1.

Claim 6. A gene construct comprising the nucleic acid of claim 1, wherein the nucleic acid is functionally linked to one or more regulatory signals.

Claim 7. The gene construct of claim 6, wherein the one or more regulatory signals enhance gene expression.

Claim 8. A vector comprising the gene construct of claim 6.

Claim 9. An organism comprising a recombinant nucleic acid that encodes a polypeptide, which elongates C₁₆- or C₁₈-fatty acids with at least two double bonds in the fatty acid by at least two carbon atoms, wherein one or more of C_{18:3}^{Δ5,9,12}, C_{20:3}^{Δ8,11,14}, C_{20:4}^{Δ5,8,11,14} and C_{20:5}^{Δ5,8,11,14,17} are not elongated.

Claim 10. The organism of claim 9, wherein the organism is a microorganism, a nonhuman animal or a plant.

Claim 11. The organism of claim 9, wherein the organism is a transgenic plant.

Claim 12. A process for the production of PUFAs, which comprises culturing the organism of claim 9, under conditions in which said PUFAs are formed in the organism.

Claim 13. The process of claim 12, wherein the PUFAs prepared by the process are C₂₀- or C₂₂-fatty acid molecules with at least two double bonds in the fatty acid molecule.

Claim 14. The process of claim 13, wherein the C₂₀- or C₂₂-fatty acid molecules are isolated from the organism in the form of an oil, a lipid or a free fatty acid.

Claim 15. The process of claim 12, wherein the organism is a microorganism, a nonhuman animal or a plant.

Claim 16. The process of claim 12, wherein the organism is a transgenic plant.

Claim 17. The process of claim 12, wherein the C₁₆- or C₁₈-fatty acid is a fatty acid with three double bonds in the molecule.

Claim 18. An oil, lipid or fatty acid or a fraction thereof, prepared by the process of claim 12.

Claim 19. An oil, lipid or fatty acid composition which comprises PUFAs and is derived from a transgenic plant.

Claim 20. The oil, lipid or fatty acid composition of claim 19, wherein the transgenic plant contains a nucleotide sequence encoding a polypeptide that elongates C₁₆- or C₁₈-fatty acids with at least two double bonds in the fatty acid molecule, wherein said nucleotide sequence is selected from the group consisting of:

the sequence of SEQ ID NO:1;

a nucleic acid sequence which, in accordance with degeneracy of the genetic code, is derived from the amino acid sequence of SEQ ID NO:2; and

derivatives of the sequence of SEQ ID NO:1 which encode polypeptides with at least 50% homology with the sequence encoding the amino acid sequences of SEQ ID NO:2, the sequence acting as C₁₆- or C₁₈-elongase.

Claim 21. Feeding stuffs, foodstuffs, cosmetics or pharmaceuticals comprising the oil, lipid or fatty acid composition of claim 19.

Claim 22. The nucleic acid of claim 1, which encodes a polypeptide that elongates C₁₆- or C₁₈-fatty acids with at least three double bonds in the fatty acid.

Claim 23. The nucleic acid of claim 1, which encodes a polypeptide that elongates C₁₆- or C₁₈-fatty acids with at least four double bonds in the fatty acid.

Claim 24. The nucleic acid of claim 1, wherein the polypeptide shows a preference for elongating C_{18:3}^{Δ6,9,12}, C_{18:4}^{Δ6,9,12,15}, or C_{16:3}^{Δ7,10,13} -fatty acids as compared to one or more of C_{18:2}^{Δ9,12}, C_{18:3}^{Δ4,7,10}, C_{18:3}^{Δ5,8,11}, C_{18:3}^{Δ7,10,13}, C_{18:3}^{Δ8,11,14}, C_{18:3}^{Δ9,12,15} or C_{18:3}^{Δ5,c9,12} -fatty acids.

Claim 25. The nucleic acid of claim 24, wherein the preference is at least a factor of 1.5.